



UNITED STATES DEPARTMENT OF COMMERCE
Patent and Trademark Office

Address: COMMISSIONER OF PATENTS AND TRADEMARKS
Washington, D.C. 20231

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
-----------------	-------------	----------------------	---------------------

08/807,737 02/27/97 OHTANI

H 0756-1428

EXAMINER

SIXBEY FRIEDMAN LEEDOM & FERGUSON
2010 CORPORATE RIDGE
SUITE 600
MCLEAN VA 22102

MMC2/0622

ART UNIT E PAPER NUMBER

DATE MAILED: 25:13

06/22/00

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

Office Action Summary

Application No.

08/807,737

Applicant(s)

OHTANI ET AL.

Examiner

Evan T. Pert

Art Unit

2813

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).

Status

- 1) ☒ Responsive to communication(s) filed on 31 March 2000.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 19-83 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 19-83 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claims _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are objected to by the Examiner.
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).
- a) ☒ All b) ☐ Some * c) ☐ None of the CERTIFIED copies of the priority documents have been:
1. ☐ received.
2. ☒ received in Application No. (Series Code / Serial Number) 08/391,580.
3. ☐ received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

- 14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. & 119(e).

Attachment(s)

- 15) ☐ Notice of References Cited (PTO-892)
- 16) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 17) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 32.
- 18) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 19) ☐ Notice of Informal Patent Application (PTO-152)
- 20) ☐ Other: _____.

DETAILED ACTION

Terminal Disclaimer

1. The terminal disclaimer filed on 5/30/00 disclaiming the terminal portion of any patent granted on this application which would extend beyond the expiration date of U.S. Patent 5,605,846 has been reviewed and is accepted. The terminal disclaimer has been recorded.

Specification

2. The disclosure is objected to because of informalities for which the examiner suggests the following changes:

On page 6, line 17, after "absence of" insert --a--.

On page 28, line 26, change "rational speed" to --rotational speed--.

Appropriate correction is required.

3. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

The following is a quotation of 37 CFR 1.71(a)-(c):

(a) The specification must include a written description of the invention or discovery and of the manner and process of making and using the same, and is required to be in such full, clear, concise, and exact terms as to enable any person skilled in the art or science to which the invention or discovery appertains, or with which it is most nearly connected, to make and use the same.

(b) The specification must set forth the precise invention for which a patent is solicited, in such manner as to distinguish it from other inventions and from what is old. It must describe completely a specific embodiment of the process, machine, manufacture, composition of matter or improvement invented, and must explain the mode of operation or principle whenever applicable. The best mode contemplated by the inventor of carrying out his invention must be set forth.

(c) In the case of an improvement, the specification must particularly point out the part or parts of the process, machine, manufacture, or composition of matter to which the improvement relates, and the description should be confined to the specific improvement and to such parts as necessarily cooperate with it or as may be necessary to a complete understanding or description of it.

The specification is objected to under 37 CFR 1.71 because it fails to support the step of heating to form a non-(111) silicon layer as claimed in claims 29, 36, and 66. As discussed below, the prior art of record indicates that non-(111) orientation is not guaranteed by laser crystallization of amorphous Si in contact with silicon nitride.

The specification is also objected to under 37 CFR 1.71 because it fails to support claim 74 solving the problems with nickel oxide as the means to deliver nickel (see rejection below).

Claim Objections

4. Claim 36 is objected to because of the following informalities: "substate" should be changed to --substrate--. Appropriate correction is required.

Claim Rejections - 35 USC § 112

5. Claims 29, 36, and 66 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

Specifically, one of ordinary skill in the art would not readily understand what is necessary to guarantee a non-(111) orientation as required by claims 29, 36, and 66. In support of this position, the examiner cites Fehlner et al. ('772), who teach in lines 31-44 of col. 6 that the (111) is not preferred, but laser crystallization in the art has resulted in inconsistent orientation (even though silicon nitride is taught as a base coat in the lines preceding).

Art Unit: 2813

6. Claim 74 is rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. According to U.S. Patent 5,403,772, oxide of nickel is not suitable since it can not start the required reaction (col. 6, lines 9-12).

7. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

8. Claims 19-83 are rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential steps, such omission amounting to a gap between the steps. See MPEP § 2172.01. The omitted steps are: Before crystallization, disposing the metal effective contact with (not just "on") the silicon nitride. In claim 72, the step of opening holes in the overlying oxide to place selective seeding (metal) is missing.

In claim 72, the oxide layer covers the amorphous Si, seemingly preventing the required "contact".

In claim 72, it is necessary to provide openings to seed the layer, an essential step not present in the claim.

In claims 78-83, the limitation that the silicon nitride is in contact with the metal that promotes crystallization, but "contact" (effective contact) is required by the specification (page 5).

9. Claims 24, 29, 36, 66, and 72 are rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential steps, such omission amounting

Art Unit: 2813

to a gap between the steps. See MPEP § 2172.01. The omitted steps are: disposing a solution to deposit the metal that promotes crystallization.

10. Claims 19, 24, 29, 36, 60, 66, and 72 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The independent claims provide the limitation that the silicon nitride is formed to contain at least one of hydrogen and oxygen, but the claims fail to distinguish the required concentration levels from the inherent (impurity) concentration of the prior art.

Dependent claims 48, 51, 54, 57, 63, 69, and 75 specify a concentration, but is unclear how this differs from inherent hydrogen concentration from CVD-deposited silicon nitride of the prior art since hydrogen is inherent to CVD-deposited silicon nitride (see applicant's argument paper no. 31, starting bottom of page 3).

Allowable Subject Matter

11. The following is a statement of reasons for the indication of allowable subject matter: The prior art of record does not teach forming a silicon nitride layer (having a preferred nitrogen:silicon ratio of 1.3 to 1.5) wherein the silicon nitride layer contains a specific amount of hydrogen and/or oxygen, and wherein amorphous silicon is crystallized in contact with the silicon nitride after having been exposed to a solution containing a metal that promotes crystallization.

Conclusion

12. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Zhang et al. ('772) filed 12/3/1993 teaches catalytic effect of metal and lateral growth of the crystal).

Kwasnick et al. ('920) teaches typical active layer thickness and hydrogenation of the silicon nitride).

B.C. Ahn et al. ("Batch Processing of...") teach LPCVD of silicon nitride for TFTs.

Fehlner et al. ('772) teach various limitations of the instant application including silicon nitride in contact with the amorphous silicon, a silicon dioxide cap (of claim 72), annealing with a laser.

Tominaga et al. ('041) teach an inverted stagger structure with silicon nitride in contact with the amorphous silicon when it is crystallized).

Biegesen et al. ('363) teach patterning an amorphous layer to get island and using a laser to crystallize.

Sera et al. ("High-Performance TFT's...") teach laser annealing and a silicon nitride base layer.

Zhang et al. ("KrF Excimer Laser Annealed...") teach a laser anneal of amorphous silicon to get TFTs.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Evan T. Pert whose telephone number is 703-306-5689. The examiner can normally be reached on M-F (7:00-3:30).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Charles Bowers can be reached on 703-308-2417. The fax phone numbers

Application/Control Number: 08/807,737

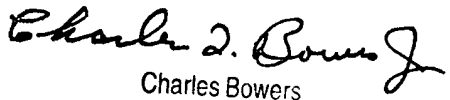
Page 7

Art Unit: 2813

for the organization where this application or proceeding is assigned are 703-308-7722 for regular communications and 703-308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

ETP
June 19, 2000


Charles Bowers
Supervisory Patent Examiner
Technology Center 2800